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NASA SP-7011 (393)
October 1994

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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NASA SP-7011 (393)
October 1994

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

National Aeronautics and Space Administration
Scientific and Technical Information Program
Washington, DC 1994

This publication was prepared by the NASA Center for AeroSpace Information,
800 Elkridge Landing Road, Linthicum Heights, MD 21090-2934, (301) 621-0390.

INTRODUCTION

This issue of *Aerospace Medicine and Biology* (NASA SP-7011) lists 29 reports, articles, and other documents recently announced in the NASA STI Database. The first issue of *Aerospace Medicine and Biology* was published in July 1964.

Accession numbers cited in this issue include:

Scientific and Technical Aerospace Reports (STAR) (N-10000 Series)	N94-35226 — N94-36519
Open Literature (A-60000 Series)	A94-60256 — A94-61273

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the publication consists of a standard bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged by *STAR* categories 51 through 55, the Life Sciences division. The citations include the original accession numbers from the respective announcement journals.

Seven indexes—subject, personal author, corporate source, foreign technology, contract number, report number, and accession number—are included.

A cumulative index for 1994 will be published in early 1995.

Information on availability of documents listed, addresses of organizations, and CASI price schedules are located at the back of this issue.

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TYPICAL REPORT CITATION AND ABSTRACT

NASA SPONSORED
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ACCESSION NUMBER → **N94-11045*#** Pennsylvania State Univ., Hershey. Coll. of ← CORPORATE SOURCE
Medicine.

TITLE → **EFFECTS OF CSF HORMONES AND IONIC COMPOSITION ON SALT/WATER METABOLISM Final Technical Report, 1 Mar. 1981 - 31 Dec. 1992**

AUTHOR → WALTER B. SEVERS 31 Dec. 1992 32 p ← PUBLICATION DATE

CONTRACT NUMBER → (Contract NCC2-127)

REPORT NUMBERS → (NASA-CR-193232; NAS 1.26:193232) Avail: CASI HC A03/MF A01 ← AVAILABILITY AND PRICE CODE

The consequences of headward fluid shifts during manned spaceflight was studied. Such shifts were recognized early by both U.S. and Soviet scientists because of signs and symptoms referable to the head. Some of these include disturbed vision, puffiness in the face and periorbital areas, headache, vestibular dysfunction, and distended jugular veins. We posited that the fluid shift had an immediate effect on the brain and a long-term action requiring a neural interpretation of the flight environment. This would re-adjust both efferent neural as well as hormonal mechanisms to sustain cardiovascular and fluid/electrolyte balance consonent with survival in microgravity. Work along these lines is summarized. A synopsis of some of the main research is presented. The following topics were studied: (1) angiotensin and vasopressin action in the central nervous system; (2) intracranial pressure control; (3) research on subcommissural organ; and (4) research on the eye.

Author (revised)

TYPICAL JOURNAL ARTICLE CITATION AND ABSTRACT

ACCESSION NUMBER → **A94-60203**

TITLE → **ESTIMATION OF THE LOW-EARTH-ORBIT DEBRIS POPULATION AND DISTRIBUTION**

AUTHORS → KYLE T. ALFRIEND General Research Corp., VA and ← AUTHORS' AFFILIATION
D. LAURIE LEWIS *Journal of Spacecraft and Rockets* (ISSN 0022- ← JOURNAL TITLE
4650) vol. 31, no. 1 January-February 1994 p. 48-53 refs ← PUBLICATION DATE

REPORT NUMBER → (BTN-94-EIX94311322893) Copyright

In this paper, an algorithm for estimating the low-Earth-orbit space object population and distribution from measurements taken by a vertical, staring narrow beam radar is developed and validated. The radar measures the altitude, inclination, and radar cross section of each object which passes through the beam. The effects of the assumptions made in developing the algorithm and measurement errors are discussed. An estimate of the operational time of the radar needed to achieve a specified accuracy in the space object population is also developed. EI

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 393)

October 1994

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LIFE SCIENCES (GENERAL)

A94-60694
DISCRIMINATION OF TASTE OF AMINO ACIDS WITH A MULTICHANNEL TASTE SENSOR
YUKIKO KIKKAWA Kyushu Univ., Fukuoka (Japan), KIYOSHI TOKO, TETSUYA MATSUNO, and KAORU YAMAFUJI *Japanese Journal of Applied Physics, Part 1: Regular Papers & Short Notes & Review Papers* (ISSN 0021-4922) vol. 32, no. 12A December 1993 p. 5731-5736 refs
(BTN-94-EIX94301314445) Copyright

Taste of amino acids was studied using a multichannel taste sensor with lipid membranes as the transducer of taste substances. The study on taste of amino acids has drawn much attention so far because each of them elicits complicated mixed taste. The response of the sensor to amino acids was compared with results of panel tests, and response potentials from the eight membranes were transformed to terms representing five basic tastes by multiple linear regression. This expression of five basic tastes reproduced human taste sensation very well. The taste was expressed more quantitatively by assuming new channels, which are represented by multiplication of the response potentials of the original channels. This new set of channels implies the existence of processes involving the nervous system which is connected with taste cells. Author (EI)

A94-61173
MULTI-RELAXATION FD(EXP 2)-TD METHOD FOR MODELING DISPERSION IN BIOLOGICAL TISSUES
ROLANDO PONTALTI Centro Materiali e Biofisica Medica, Trento (Italy), LUCA CRISTOFORETTI, RENZO ANTOLINI, and LORENZA CESCATTI *IEEE Transactions on Microwave Theory and Techniques* (ISSN 0018-9480) vol. 42, no. 3 March 1994 p. 526-528 refs
(BTN-94-EIX94311330883) Copyright

Pulse excitation in FD-TD provides multifrequency results with a single run of the code. The introduction of the frequency dependent FD-TD ((FD)(exp 2)-TD) has also recently provided a means to deal with dispersive materials on condition that they had a first order permittivity. A multirelaxation approach is presented to widen the (FD)(exp 2)-TD applicability to materials with more complex permittivity such as biological tissues. Author (EI)

N94-35232* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
MULTI-CELLULAR, THREE-DIMENSIONAL LIVING MAMMALIAN TISSUE Patent
THOMAS J. GOODWIN, inventor (to NASA) and DAVID A. WOLF, inventor (to NASA) 3 May 1994 7 p Filed 3 Sep. 1992 Continuation of US-Patent-Appl-SN-317931, filed 2 Mar. 1989 which is a continuation-in-part of US-Patent-Appl-SN-213558, filed 30 Jun. 1988 which is a continuation-in-part of US-Patent-Appl-SN-213559, filed 30 Jun. 1988
(NASA-CASE-MSC-21560-2; US-PATENT-5,308,764; US-PATENT-APPL-SN-939791; US-PATENT-APPL-SN-317931; US-PATENT-APPL-SN-213558; US-PATENT-APPL-SN-213559; US-PATENT-CLASS-435-240.24; US-PATENT-CLASS-435-240.2; US-PATENT-CLASS-435-240.25; US-PATENT-CLASS-435-1) Avail: US Patent and Trademark Office

The present invention relates to a multicellular, three-dimensional, living mammalian tissue. The tissue is produced by a co-culture process wherein two distinct types of mammalian cells are co-cultured in a rotating bioreactor which is completely filled with culture media and cell attachment substrates. As the size of the tissue assemblies formed on the attachment substrates changes, the rotation of the bioreactor is adjusted accordingly.
Official Gazette of the U.S. Patent and Trademark Office

N94-35257*# Washington State Univ., Pullman, WA. Inst. of Biological Chemistry.
EFFECT OF MICROGRAVITY ON PLANT GROWTH Final Report
NORMAN G. LEWIS 1994 3 p
(Contract NAG10-0086)
(NASA-CR-196004; NAS 1.26:196004) Avail: CASI HC A01/MF A01

The overall goal of this research is to determine the effect of microgravity proper on plant growth (metabolism and cell wall formation). In addressing this goal, the work conducted during this grant period was divided into three components: analyses of various plant tissues previously grown in space aboard MIR Space Station; analyses of wheat tissues grown on Shuttle flight STS-51; and Phenylpropanoid metabolism and plant cell wall synthesis (earth-based investigations). Derived from text

N94-35366* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
HIGH DENSITY CELL CULTURE SYSTEM Patent
GLENN F. SPAULDING, inventor (to NASA) 19 Jul. 1994 7 p Filed 23 Dec. 1992 Supersedes N93-19037 (31 - 6, p 1593)
(NASA-CASE-MSC-22060-1; US-PATENT-5,330,908; US-PATENT-APPL-SN-996263; US-PATENT-CLASS-435-240.24; US-PATENT-CLASS-435-240.25; US-PATENT-CLASS-435-286; US-PATENT-CLASS-435-296; US-PATENT-CLASS-435-312; US-PATENT-CLASS-435-313; US-PATENT-CLASS-435-816) Avail: US Patent and Trademark Office

An annular culture vessel for growing mammalian cells is constructed in a one piece integral and annular configuration with an open end which is closed by an endcap. The culture vessel is rotatable about a horizontal axis by use of conventional roller systems commonly used in culture laboratories. The end wall of the endcap has tapered access ports to frictionally and sealingly receive the ends of hypodermic syringes. The syringes permit the introduction of fresh nutrient and withdrawal of spent nutrients. The walls are made of conventional polymeric cell culture material and are subjected to neutron bombardment to form minute gas permeable perforations in the walls.
Official Gazette of the U.S. Patent and Trademark Office

N94-35601 Direction des Recherches, Etudes et Techniques, Paris (France). Centre de Documentation de l'Armement.
STRESS AND BRAIN PROTEIN SYNTHESIS Final Report

S00000 000001

[STRESS ET SYNTHESE PROTEIQUE CEREBRALE]
G. BOBILLIER 1994 33 p In FRENCH
(PB94-170750) Avail: Issuing Activity (National Technical Information Service (NTIS))

This study investigates the effect of adrenalectomy and peripheral administration of glucocorticoids (GC's) on protein synthesis in rat brain. The researchers began by fully validating the L-((35)S) Methionine method, forcing them to abandon a study on the effect of GC's on energy metabolism in the brain because of technical difficulties. They found that GC's have a tonic, generalized, and persistent inhibiting effect on brain protein synthesis in rats. Glucocorticoids are not directly responsible for inducing brain protein synthesis during the stress alarm phase, but rather intervene during the adaptation phase to restore and maintain the normal basal rate of protein synthesis activity in the brain. These neuroendocrine factors likely play a major role in relations between the brain and peripheral system, and vice-versa. NTIS

N94-36101 National Inst. of Radiological Sciences, Chiba (Japan). Science and Technology Agency.
ACTIVITIES OF NATIONAL INSTITUTE OF RADIOLOGICAL SCIENCES Annual Report, Apr. 1991 - Mar. 1992
Jul. 1992 113 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(DE94-727636; NIRS-31) Avail: CASI HC A06

This annual report is a compilation of the research activities and achievement in the National Institute of Radiological Sciences (NIRS) in Japan during the fiscal year 1991 (from April 1991 through March 1992). The research covers a wide range of radiological sciences from molecular to environmental studies and medicine including engineering. Topics consist of physics, chemistry, biomedical science, clinical research, and environmental sciences, covering a total of 69 titles. A list of publications by staff members, activities of research divisions, and organization chart of the NIR are given in the Appendix. DOE

N94-36269 California Univ., Berkeley. Lawrence Berkeley Lab, CA.
A LOW TEMPERATURE SCANNING FORCE MICROSCOPE FOR BIOLOGICAL SAMPLES Ph.D. Thesis
M. G. L. GUSTAFSSON (California Univ., Berkeley, CA.) May 1993 200 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract DE-AC03-76SF-00098)
(DE94-011357; LBL-34182) Avail: CASI HC A09

An SFM has been constructed capable of operating at 143 K. Two contributions to SFM technology are described: a new method of fabricating tips, and new designs of SFM springs that significantly lower the noise level. The SFM has been used to image several biological samples (including collagen, ferritin, RNA, purple membrane) at 143 K and room temperature. No improvement in resolution resulted from 143 K operation; several possible reasons for this are discussed. Possibly sharper tips may help. The 143 K SFM will allow the study of new categories of samples, such as those prepared by freeze-frame, single molecules (temperature dependence of mechanical properties), etc. The SFM was used to cut single collagen molecules into segments with a precision of less than or equal to 10 nm. DOE

N94-36481# Argonne National Lab., IL.
FEMTOSECOND TRANSIENT ABSORPTION STUDIES OF THE LIGHT HARVESTING CHL A/B PROTEIN COMPLEX OF PHOTOSYSTEM 2 IN HIGHER PLANTS
T. BITTNER, M. R. WASIELEWSKI, and K. D. IRRGANG 1994 4 p Presented at the 9th International Conference on Ultrafast Phenomena, Dana Point, CA, 1-5 May 1994
(Contract W-31-109-ENG-38)
(DE94-009684; ANL/CHM/CP-81874; CONF-940593-6) Avail: CASI HC A01/MF A01

The first steps of the primary reactions in photosynthesis are the generation of electronically excited states (excitons) by light absorption within pigment protein complexes referred to as light harvesting antenna complexes and rapid exciton migration to the photoactive pigments embedded into the reaction center complex where the transformation into electrochemical free energy takes place. In green algae and higher plants the light harvesting Chl a/b complex associated with Photosystem 2 (LHC2) serves as the main antenna complex. In this communication we present intensity dependent transient absorption measurements with fs-time resolution in isolated LHC 2 preparations to address the problem of the interaction of ultrafast exciton migration and exciton-exciton annihilation. DOE

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

A94-61012
NEW METHOD FOR EVALUATING LOCAL PULSE WAVE VELOCITY BY MEASURING VIBRATIONS ON ARTERIAL WALL
H. KANAI Tohoku Univ., Sendai, Japan, K. KAWABE, M. TAKANO, R. MURATA, N. CHUBACHI, and Y. KOIWA *Electronics Letters* (ISSN 0013-5194) vol. 30, no. 7 March 31 1994 p. 534-536 refs
(BTN-94-EIX94311332188) Copyright

A new method is proposed for measuring the local pulse wave velocity (PWV), which is an index of the hardness of the aortic wall. Using the method, high spatial resolution, which is necessary in the evaluation of local hardness, is attained. Author (EI)

N94-35345* National Aeronautics and Space Administration, Washington, DC.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 391)
Aug. 1994 42 p
(NASA-SP-7011(391); NAS 1.21:7011(391)) Avail: CASI HC A03

This bibliography lists 75 reports, articles, and other documents introduced into the NASA Scientific and Technical Information System during Aug. 1994. Subject coverage includes: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance. Author

N94-36217 Institut National de la Sante et de la Recherche Medicale, Paris (France). Lab. de Physiologie des Adaptations.
TYPOLOGY OF SKELETAL MUSCLE IN HUMANS UNDERGOING INTENSE PHYSICAL TRAINING OR PROLONGED AKINESIA Final Report [TYPOLOGIE DU MUSCLE STRIE CHEZ L'HOMME EN SITUATION D'ENTRAINEMENT PHYSIQUE INTENSE OU D'AKINESIE PROLONGEE]
M. RIEU and A. X. BIGARD 1994 44 p In FRENCH Sponsored by Direction des Recherches, Etudes et Techniques
(PB94-170644) Avail: Issuing Activity (National Technical Information Service (NTIS))

There were three parts to this study: experimental attempts to use the micropuncture biopsy technique for animals on humans; a preliminary study of the muscular typology of severe burn patients and how it changes over time; and an analysis of the effects of muscular electrostimulation on the typology of musculus vastus externus in athletes. The biopsy technique was found to be yield usable muscle samples after some practice. The particularly low levels of muscular glycogen measured in what were relatively light burn cases were surprising, and will have to be confirmed by a larger, longer-term study. A relatively low proportion of type I fibers, and a high proportion of type IIB fibers, was discovered. Finally, the authors found that training programs based on electrostimulation

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often used to improve muscular strength modify neither the size nor topology of skeletal muscle. NTIS

N94-36220 Centre d'Etudes et de Recherches Bio-Physiologiques Appliquees a la Marine, Toulon (France).
EFFECTS OF 5 MPA HELIOX PRESSURE ON DOPAMINER GIC PATHWAY: AN IN VIVO NEUROCHEMICAL STUDY [ETUDE NEUROCHIMIQUE DE L'ACTION DES HAUTES PRESSIONS D'HELIUM PAR L'ADAPTATION DE LA TECHNIQUE DE MICRODIALYSE INTRACERABRALE A L'HYPERBARIE]
J. J. RISSO and M. BARTHELEMY-REQUIN Dec. 1992 31 p In FRENCH
(Contract DRET-88-1011)
(PB94-170693; CERB-92-12) Avail: Issuing Activity (National Technical Information Service (NTIS))

The laboratory adapted the intracranial microdialysis technique to hyperbaric conditions. Free-moving rats were stereotaxically implanted in the anterior caudate nucleus with a microdialysis probe to measure dopamine, dihydroxyphenylacetic acid, and homovanillic acid levels during different phases of a simulated dive up to 5.1 MPa. Compression was found to increase extracellular dopamine and dihydroxphenylacetic acid concentrations, except in homovanillic acid. This represents a specific effect on high pressure on the dopaminergic pathway, and may be due to an increase of dopamine synthesis through a direct action on D2 autoreceptors. NTIS

N94-36223# Midwest Research Inst., Kansas City, MO.
FURTHER STUDIES OF 60-HZ EXPOSURE EFFECTS ON HUMAN FUNCTION
C. GRAHAM and H. D. COHEN 29 Mar. 1994 8 p
(Contract DE-FG01-89CE-34025)
(DE94-010192; DOE/CE-34025/T12) Avail: CASI HC A02/MF A01

The objective of the exploratory study was to determine whether the electric or magnetic field, presented separately in an intermittent fashion, would produce the same pattern of heart rate increases and decreases seen in the original intermittent exposure study. In addition, time of day and baseline heart rate were explored in an attempt to clarify design issues that arose from previous studies. Twenty-four healthy young men 21 to 35 years of age participated in the study. Half were exposed to a 9-kV/m electric field and half to a 200-mG magnetic field. Within each of these groups, half were exposed in the morning and half in the afternoon. DOE

N94-36338# Aerospace Medical Research Labs., Brooks AFB, TX. Sustained Operations Branch.
DETERMINANTS OF SUBJECTIVE FATIGUE FOR C-141 CREWS DURING OPERATION DESERT STORM
JONATHAN FRENCH, KELLY J. NEVILLE, WILLIAM F. STORM, ROGER U. BISSON, and PATRICIA BOLL *In* AGARD, Recent Advances in Long Range and Long Endurance Operation of Aircraft 12 p Nov. 1993
Copyright Avail: CASI HC A03/MF A03

As aircraft flight endurance capabilities increase, the importance of attenuating fatigue during long duration missions increases. Profile of Mood States (POMS) data were used to document cumulative fatigue and to explore the relationships between mission characteristics and changes in mood of C-141 aircrew members during Operation Desert Storm. In particular, this research assessed the effects of increasing the limit of 30-day cumulative flight for long duration transport crews from 125 to 150 hours. POMS data were collected at the beginning of the legal for alert (LFA) and crew rest (CR) intervals. Correlational analyses were used to compare POMS dimensions (anger, depression, confusion, fatigue, vigor, tension) with 13 flight and sleep schedule variables. During both LFA and CR intervals, 30-day cumulative flight hours were not related to subjective mood dimensions. However, when 30 day cumulative flight hours exceeded 125 hours, POMS vigor was decreased by recent flight and sleep hours. Therefore, attending to recent sleep and flight history may predict decrements in vigor when operational pressures require exceeding the normal cumulative flight hours per month. A first attempt to construct a crew rest equation is proposed that accounts for these factors. This equation is based on a stepwise multiple regression procedure which revealed that vigor and fatigue were best predicted by cumulative 24-hour sleep and 48-hour flight time. In addition to improved crew rest schedules, dedicated crew rest facilities and sleep hygiene instruction are recommended before flying long duration missions. Author

N94-36339# Centre d'Etudes et de Recherches de Medecine Aerospatiale, Bretigny sur Orge (France).
SOME SOLUTIONS TO REDUCE THE HUMAN EFFECTS OF EXTENDED OPERATION TIMES [QUELQUES SOLUTIONS POUR REDUIRE LES EFFETS SUR L'HOMME DES OPERATIONS DE LONGUE DUREE]
D. LAGARDE and D. BATEJAT *In* AGARD, Recent Advances in Long Range and Long Endurance Operation of Aircraft 17 p Nov. 1993 In FRENCH
Copyright Avail: CASI HC A03/MF A03

Mostly, in aeronautical environment, the extended operation times assume the continued operations aspect with long duration flights, sometimes transmeridian. In this operations setting, the fast and repeated passing of several time zones is attended with the classical symptomatology of 'jet-lag', intensified by the conditions of the mission. The appearance and the extent of 'jet-lag' are variable according to the flight and the involved subject characteristics; nevertheless, the psychomotor performances decrease is a constant factor of these disorders. In order to investigate with a greater accuracy this aspect in laboratory, the authors present a study model represented by the STRES battery, an ensemble of seven psychomotor tests, recommended by the working group n degrees 12 of the AGARD/NATO, that allows the evaluation of the whole psychomotor register of a subject situated in stress environmental conditions, in a broad meaning. Two examples of these tests to sleep deprivation states are introduced so as to illustrate the sensibility and the interest of implementing this test battery. In view of the disorder's penalizing effect, several authors have postulated solutions in order to suppress or at least to reduce the duration and importance of such symptoms. Thus, some accurate instructions have been recommended relating to the maximum workload condition that can not be exceeded and to the dual aircrew. Others have enjoined to be synchronized with the new time table before departure or to strengthen the social 'zeitgeber' at arrival. Phototherapy, naps, dietetic measures, and physical exercise are also a part of the suggested steps. The pharmacological approach with the use of caffeine, hypnotics, and more recently melatonin have a new lease of interest especially with the appearance of new awakening drugs, as powerful as amphetamines but without their secondary effects. Thus, after the justification of the stimulating drugs' use in the setting of wake sleep rhythms desynchronization, the authors present concisely the modafinil, main representative of this new molecule category. Then, from examples from the laboratory, on occasion of psychomotor performance evaluation with the STRES battery on subjects under sleep deprivation, or on field, they present some results obtained after dispensation of this drug. At the end of this review and of the experimental results, it appears that the extended operation times induce wake-sleep rhythm and psychomotor performances disorders. Numerous possibilities, complementary, exist in order to reduce the observed disorders; none of them appears alone sufficient. Nevertheless, the new awakening drugs appearance, on account of their great efficiency and their whole inocuity, should constitute a major element in biological rhythms resynchronization in the future. Author (revised)

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BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N94-35379*# Massachusetts Inst. of Tech., Cambridge. Man Vehicle Lab.
VISUAL-VESTIBULAR INTERACTION Final Report
LAURENCE R. YOUNG and D. MERFELD Jun. 1994 9 p
(Contract NAG2-445)
(NASA-CR-196097; NAS 1.26:196097) Avail: CASI HC A02/MF A01

Significant progress was achieved during the period of this grant on a number of different fronts. A list of publications, abstracts, and theses supported by this grant is provided at the end of this document. The completed studies focused on three general areas: eye movements induced by dynamic linear acceleration, eye movements and vection reports induced by visual roll stimulation, and the separation of gravito-inertial force into central estimates of gravity and linear acceleration. Derived from text

N94-35528 Army Aeromedical Research Lab., Fort Rucker, AL.
ACCOMMODATION DURING INSTRUMENT VIEWING CAN BE INFLUENCED BY KNOWLEDGE OF OBJECT DISTANCE Final Report
JOHN C. KOTULAK, STEPHEN E. MORSE, and ROGER W. WILEY Mar. 1994 14 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(AD-A278987; USAARL-94-13) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

The level of accommodation during instrument viewing is influenced by the perceived nearness of the object in subjects with proximal, but not distal, dark focuses. The topics covered include the following: instrument myopia, accommodations night vision goggles, and known object distance. DTIC

N94-36215 Direction des Recherches, Etudes et Techniques, Paris (France). Direction Scientifique Soutien a la Recherche.
ATTENTION AND SIGNAL DETECTION. A STUDY OF ATTENTION DIVIDED BETWEEN VISUAL AND AUDITORY SIGNALS [ATTENTION ET DETECTION DE SIGNAUX. ETUDE DE L'ATTENTION DIVISEE ENTRE VISION ET AUDITION]
A. M. BONNEL 1993 42 p In FRENCH
(PB94-170594) Avail: Issuing Activity (National Technical Information Service (NTIS))

In a series of dual tasks, we asked observers to divide their attention between a patch of light at the center of a screen and a pure auditory tone simultaneously transmitted through earphones. Instructions were to direct 20 percent of attention to the sound and 80 percent to the light (or vice-versa); or 50 percent to each; or, in the single control experiment, 100 percent to one. The results are interpreted in light of a hierarchical model or functional architecture in which cognitive penetrability is not operative at the most basic stages. Sensory coding during detection would be pure transduction, comparable to a computer interrupt. In identification, it would be a test, modulating sensitivity by top-down control through attention. NTIS

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N94-35266*# North Carolina Univ., Charlotte, NC. Dept. of Mechanical Engineering and Engineering Science.
DESIGN AND SIMULATION OF EVA TOOLS FOR FIRST SERVICING MISSION OF HST Semiannual Report, 15 Jul. 1993 - 14 Jan. 1994
DIPAK NAIK and P. H. DEHOFF 1994 77 p
(Contract NAG5-2038)
(NASA-CR-196030; NAS 1.26:196030; ME/ES-TR-94-1) Avail: CASI HC A05/MF A01

The Hubble Space Telescope (HST) was launched into near-earth orbit by the Space Shuttle Discovery on April 24, 1990. The payload of two cameras, two spectrographs, and a high-speed photometer is supplemented by three fine-guidance sensors that can be used for astronomy as well as for star tracking. A widely reported spherical aberration in the primary mirror causes HST to produce images of much lower quality than intended. A Space Shuttle repair mission in January 1994 installed small corrective mirrors that restored the full intended optical capability of the HST. The First Servicing Mission (FSM) involved considerable Extra Vehicular Activity (EVA). Special EVA tools for the FSM were designed and developed for this specific purpose. In an earlier report, the details of the Data Acquisition System developed to test the performance of the various EVA tools in ambient as well as simulated space environment were presented. The general schematic of the test setup is reproduced in this report for continuity. Although the data acquisition system was used extensively to test a number of fasteners, only the results of one test each carried on various fasteners and the Power Ratchet Tool are included in this report. Author

N94-35600 Rutherford Appleton Lab., Chilton (England).
MMI(EXP 2) DEMONSTRATOR SYSTEMS: A MULTI-MODAL INTERFACE FOR MAN MACHINE INTERACTION WITH KNOWLEDGE BASED SYSTEMS. DELIVERABLE D17 (TA 2) ESPRIT PROJECT 2474 MMI(EXP 2)
M. D. WILSON Feb. 1994 105 p See also PB92-143619 Sponsored by European Strategic Program for Research and Development in Information Technology, Brussels, Belgium
(PB94-170537; RAL-94-016) Avail: Issuing Activity (National Technical Information Service (NTIS))

The MMI(sup 2) project has developed two demonstrators of co-operative user interfaces to Knowledge Based Systems which employ multiple modes of interaction: natural language, command language, graphics, gesture, direct manipulation and non-verbal audio. The purpose of both demonstrators was to demonstrate multi-modal interaction, to devise an architecture to support a co-operative multi-modal interface, to test the integration of the various technologies required, to define the meaning representation language required by such an architecture, and to investigate the requirements for a co-operative dialog interface. This document provides an overview of the system architecture, the development method and each of the modules in the architecture. It then provides test scripts used for each of the demonstrators which illustrate features of the co-operative human computer dialog that they support. NTIS

N94-35633*# Cincinnati Univ., OH. Dept. of Aerospace Engineering.
SELF-RESCUE STRATEGIES FOR EVA CREWMEMBERS EQUIPPED WITH THE SAFER BACKPACK
TREVOR WILLIAMS and DAVID BAUGHMAN *In* NASA. Goddard

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Space Flight Center, Flight Mechanics/Estimation Theory Symposium, 1994 p 357-371 May 1994
Avail: CASI HC A03/MF A04

An extravehicular astronaut who becomes separated from a space station has three options available: grappling the station immediately by means of a 'shepherd's crook' device; rescue by either a second crewmember flying an MMU or a robotic-controlled MMU; or self-rescue by means of a propulsive system. The first option requires very fast response by a tumbling astronaut; the second requires constant availability of an MMU, as well as a rendezvous procedure thousands of feet from the station. This paper will consider the third option, propulsive self-rescue. In particular, the capability of the new Simplified Aid for EVA Rescue (SAFER) propulsive backpack, which is to be tested on STS-64 in Sep. 1994, will be studied. This system possesses an attitude hold function that can automatically detumble an astronaut after separation. On-orbit tests of candidate self-rescue systems have demonstrated the need for such a feature. SAFER has a total delta(v) capability of about 10 fps, to cover both rotations and translations, compared with a possible separation rate of 2.5 fps. But the delta(v) required for self-rescue is critically dependent on the delay before return can be initiated, as a consequence of orbital effects. A very important practical question is then whether the total delta(v) of SAFER is adequate to perform self-rescue for worst case values of separation speed, time to detumble, and time for the astronaut to visually acquire the station. This paper shows that SAFER does indeed have sufficient propellant to carry out self-rescue in all realistic separation cases, as well as in cases which are considerably more severe than anything likely to be encountered in practice. The return trajectories and total delta(v)'s discussed are obtained by means of an 'inertial line-of-sight targeting' scheme, derived in the paper, which allows orbital effects to be corrected by making use of the visual information available to the pilot, namely the line-of-sight direction to the station relative to the stars. Author (revised)

N94-35659 Army Aeromedical Research Lab., Fort Rucker, AL.
IS INCREASED ACCOMMODATION A NECESSARY CONDITION FOR INSTRUMENT MYOPIA? Final Report
JOHN C. KOTULAK and STEPHEN E. MORSE Mar. 1994 13 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(AD-A278962; USAARL-94-14) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

Emmetropic subjects focus optical instruments as though they were myopic when the level of accommodation with instrument viewing is no greater than it is without. DTIC

N94-35688 Microelectronics Center of North Carolina, Research Triangle Park, NC. Information Technologies Div.
MODEL ENGINEERING CONCEPTS FOR AIR QUALITY MODELS IN AN INTEGRATED ENVIRONMENTAL MODELING SYSTEM
C. COATS, A. F. HANNA, D. HWANG, and D. W. BYUN 1993 13 p Symposium was held 1993 Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(Contract EPA-68-01-7365; EPA-R-816496)
(PB94-158623; EPA/600/A-94/036) Avail: CASI HC A03

Models-3 is an extensible environmental modeling system designed to meet the research and regulatory needs of the EPA and other users into the twenty-first century. As such, it must deal with a number of problems. These problems include: the scientific correctness, flexibility, and usability required; automating much of the complexity of planning, scheduling, and management of the computations associated with environmental studies and the massive volumes of data these studies produce; and the software engineering issues associated with developing a modular, scalable, extensive family of air quality models to be provided by the Models-3 system to its users. The paper is concerned with the last of these, the model engineering problem. NTIS

N94-35692 Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.
THE PREDICTION OF PILOT OPINION RATINGS USING OPTIMAL AND SUB-OPTIMAL PILOT MODELS M.S. Thesis
CRAIG R. EDKINS Mar. 1994 221 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(AD-A278679; AFIT/GAE/ENY/94M-2) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

This study details the development of a sub-optimal pilot model that blended the classical and optimal pilot model approaches in an attempt to achieve the advantages of each. This model used a numerical solution to the linear quadratic Gaussian problem to find the pilot gain, lead, and lag values that minimized a performance index consisting of task error and control usage. This development was conducted in four phases. First, an optimal pilot model developed by Systems Technology, Incorporated, was analyzed in detail. This analysis included a step-by-step example problem to clarify the model's logic and an in-depth sensitivity analysis of the model's parameters. Second, a ground and airborne evaluation of human pilot response was conducted using the Calspan variable stability Lear II aircraft. Primary pilot response parameters were recorded and examined using statistical and Fourier transform analysis in an attempt to provide insight into human pilot response. Third, a numerical solution to the linear quadratic Gaussian control problem that allows the compensator form to be predetermined was derived. Finally, the sub-optimal pilot model was developed and an analysis of the model's parameters was conducted. DTIC

N94-35707 Naval Air Warfare Center, Warminster, PA. Air Vehicle and Crew Systems Technology Dept.
A DATABASE TO EVALUATE ACCELERATION (+GZ) INDUCED LOSS OF CONSCIOUSNESS (G-LOC) IN THE HUMAN CENTRIFUGE Final Report, Jun. 1992 - Jun. 1993
ESTRELLA M. FORSTER 20 Jun. 1993 130 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(AD-A278769; NAWCADWAR-93089-60) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

Pilots of high performance aircraft may be exposed to positive acceleration (+Gz). This type of acceleration displaces blood in the head to foot direction. As the pressure in the vessels of the lower body increases, the vessels dilate, and a major proportion of the blood from the upper part of the body is shifted into these lower vessels. The pooling of blood in the lower extremities translates into a reduced cardiac output provoking the cardiovascular system to maintain adequate blood flow to the central nervous system and thereby maintain normal brain function. The symptoms of acceleration stress may lead to +Gz induced loss of consciousness (G-LOC) with potential fatal consequences. According to a survey done in 1986, approximately 12% of the Navy aircrew have experienced G-LOC inflight. When G-LOC descriptive data is available, it is usually limited to the particular investigator's research interests. Most research regarding G-LOC does not include the symptoms typical of this event. Specifically, the subject's psychological reaction to the G-LOC episode itself is often ignored. Understanding the physiology and mechanism of G-LOC is necessary to develop methods to avoid such an event. However, until an infallible method to prevent G-LOC is developed, G-LOC will occur. Hence, the thrust of G-LOC research should include understanding recovery from unconsciousness: to include G-LOC's psychological sequelae. DTIC

N94-35712 Aerospace Medical Research Labs., Wright-Patterson AFB, OH. Crew Systems Directorate.
BIBLIOGRAPHY OF RESEARCH REPORTS AND PUBLICATIONS ISSUED BY THE HUMAN ENGINEERING DIVISION Technical Report, Jan. 1987 - Dec. 1993
REBECCA J. GREEN Mar. 1994 127 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality
(AD-A278787; AL/CF-SR-1994-0003) Avail: Issuing Activity

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(Defense Technical Information Center (DTIC))

This bibliography contains the titles, authors and publication/source information for the technical reports and articles published by the Human Engineering Division of Armstrong Laboratory between January 1987 and December 1993. The bibliography is divided into seven sections: (1) Alphabetical Index; (2) Human Capabilities & Limitations; (3) Design Aiding Technologies; (4) Advanced Displays, Controls & Computer Interfaces; (5) Crew System Integration, Test & Evaluation; (6) Modeling & Simulation; and (7) Chemical Defense. DTIC

N94-35716 Carnegie-Mellon Univ., Pittsburgh, PA. Dept. of Computer Science.

THE BREAKDOWN OF OPERATORS WHEN INTERACTING WITH THE EXTERNAL WORLD

GARRETT A. PELTON and JILL F. LEHMAN Feb. 1994 40 p Limited Reproducibility: More than 20% of this document may be affected by microfiche quality

(AD-A278936; CMU-CS-94-121) Avail: Issuing Activity (Defense Technical Information Center (DTIC))

By looking at the simple task of tossing a bean bag from hand to hand, we show how the macro operator method breaks down when formulating agent models that interact with an uncertain external world. A macro operator encapsulates a plan to reach an objective. Occasionally the objective will be found to be unachievable, requiring the macro operator and its plan to be rejected. Letting the macro operator interact with the external world does not, by itself, change this situation but the fact that the results of the interaction are uncertain, and the agent's knowledge incomplete, does. The key idea is that the agent can't positively determine if progress towards the objective is being made in the external world, and thus errors will be made in rejecting a macro operator that would succeed. We show that there are a number of methods by which the agent can recover from such an operator rejection and continue toward the operator's objective. If we make operator rejection and recovery into a common mechanism, then the operators and the plans they represent will be split by the interaction into a sequence of smaller operators each doing a portion of the work toward the objective of the larger operator. The models are described in terms of Soar and we assume the reader's familiarity with both the architecture and the Problem Space Computational Model in our discussions. Author (DTIC)

N94-36336# Netherlands Aerospace Medical Centre, Soesterberg. Research Dept.

REVIEW OF HUMAN FACTORS PROBLEMS RELATED TO LONG DISTANCE AND LONG ENDURANCE OPERATION OF AIRCRAFT

RIES M. SIMONS and PIERRE J. L. VALK *In* AGARD, Recent Advances in Long Range and Long Endurance Operation of Aircraft 9 p Nov. 1993

Copyright Avail: CASI HC A02/MF A03

Long distance operations are characterized by rapid multiple time-zone changes and long irregular work schedules. Performance and alertness of aircrew engaged in these operations might be affected by circadian disruptions, sleep loss, workload, and cockpit-environmental factors, such as lower pressure, low relative humidity, and constant background noise. Recent literature on the various factors, which contribute to fatigue and reduced alertness of pilots, is reviewed. Author

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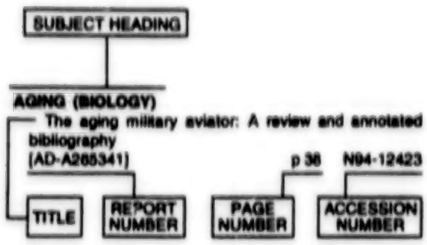

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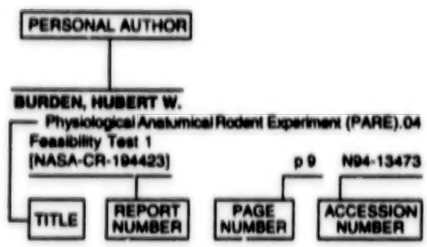

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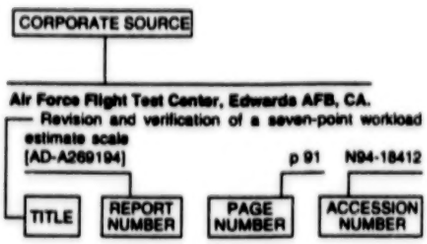

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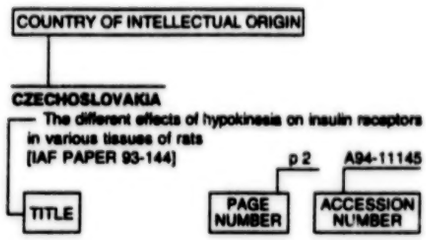

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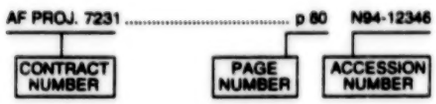

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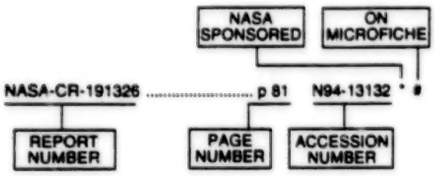

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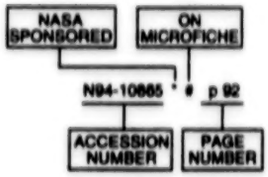

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